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71 Applicant: **Kennecott Corporation, Midland Building 101 Prospect Avenue, Cleveland Ohio 44115 (US)**

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72 Inventor: **Carpenter, James H., 212 Pangborn Blvd., Hagerstown Maryland 21740 (US)**

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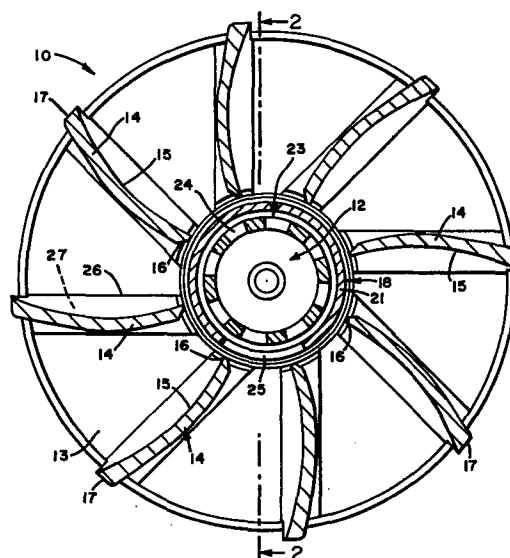
74 Representative: **Smith, Sydney et al, Elkington and Fife High Holborn House 52/54 High Holborn, London WC1V 6SH (GB)**

54 Flared vane for abrasive blasting wheel.

57 An abrasive wheel assembly comprising a rotor (12), a runnerhead (13) concentrically mounted on the said rotor for rotation at a predetermined operating RPM, a plurality of spaced radially arranged abrasive particle throwing vanes (14), means detachably securing the said vanes to the face of the said runnerhead, impeller means (18) carried by the said rotor for feeding particulate abrasive material to the said vanes, characterised in that said vanes are provided with an abrasive throwing face (15) having space side portions (29, 30) flared away from the abrasive receiving heel end portion (16) of the said vane to the discharge end thereof (17) at a flare angle in the range of from 2° to 7° is disclosed.

An abrasive particle throwing vane for use in a rotatable blasting wheel assembly, the said vane comprising a heel end portion spaced from a discharge end portion, a particle throwing face surface intermediate the said end portions, characterised in that the spaced sides of the said face flare away from the said heel end portion to the said discharge end of the said throwing face at a flare angle in the range of from 2° to 7° is also disclosed.

By virtue of the present invention, *inter alia*, it is now possible to effect even distribution of abrasive transverse of the vane face at a varying operating rate.



FLARED VANE FOR ABRASIVE BLASTING WHEEL

This invention relates to a flared vane for an abrasive blasting wheel; more generally, it relates to new and useful improvements in abrasive blasting machines and, more particularly, it relates to the abrasive throwing blades or vanes used in such machines.

Abrasive blasting machines of the type having a wheel or rotor assembly provided with a plurality of abrasive throwing blades or vanes arranged radially about the face of the rotor are well known. In use, a stream of abrasive particulate material is fed into the path of the rotating wheel from an impeller secured to the centre of the rotor. The vanes are adapted to receive and throw the abrasive from the periphery of the rotor at an appropriate discharge point in the machine casing at a blasting velocity to strip or clean metal castings, for example.

The throwing vanes, due to the nature of the use thereof, are subject to excessive wear and are therefore removably mounted on a runnerhead portion of the wheel assembly for replacement as needed. In prior art devices, the throwing vanes have been provided with varying configurations for improving the abrasive feed by increasing the length or widening the vane for changing the blast pattern as disclosed, for example, in U.S. Patents Nos. 3,242,615; 3,348,339 and 3,694,963. In other blasting machines, the vanes have been tapered or curved for providing minimum power consumption or for noise reduction purposes, such as disclosed in U.S. Patent Nos. 1,196,885 and 3,872,624. In U.S. Patent No. 2,330,949, there is disclosed a rotatable abrasive spray head wherein the vanes comprise open face channel members having a flared configuration of 10 or more degrees for spraying the abrasive therefrom.

As is evidenced by these prior art references, a

considerable amount of effort has been expended in the past in shaping the longitudinal blast pattern. However, very little attention has been given to the transverse pattern of the abrasive other than an effort to widen the pattern in order to cover a wider surface when blasting lengthwise. It has been found in these prior art vane configurations that uneven distribution of the abrasive occurs transversely across the width of the vane and has led to excessive wear in certain areas on the face of the vane. In most vane configurations, the abrasive stream is contained by one sidewall thereof where the abrasive accumulates after it enters the heel area of the vane. The abrasive follows the sidewall in a longitudinal discharge path causing excessive wear in the face of the vane adjacent the sidewall along the flow path as the accumulated abrasive follows the sidewall to its discharge.

It is an object of the present invention to provide a novel blasting wheel for an abrasive blasting machine.

Another object of the present invention is to provide a throwing vane of novel configuration for effectively reducing wear thereof during use and prolonging the operating life of the vane.

A further object of the present invention is to provide a vane for a blasting wheel capable of effecting even distribution of abrasive material across the face of the vane during operation of the wheel.

It is still another object of the present invention to obtain an even distribution of abrasive transversely across the face of a throwing vane surface at high horsepower and high abrasive flow rates without increased costs.

The present invention contemplates a vane for use in a blasting wheel of an abrasive blasting machine. The vane is provided with spaced longitudinally extending sidewalls which flare away from the heel of the vane at an angle preferably in the range of from 2 to 7 degrees. Abrasive material fed to the heel during operation of the

blasting wheel spreads transversely of the vane at a controlled rate of flow resulting in even distribution of abrasive along the entire face of the vane.

Reference may be made to the accompanying
5 illustrative drawings wherein:

FIG. 1 is a cross-sectional front elevational view of a blasting wheel assembly having throwing vanes which incorporate the present invention;

FIG. 2 is a sectional view taken on the line 2-2 of
10 FIG. 1; and

FIG. 3 is a perspective view of a throwing vane of FIGS. 1 and 2 removed from the blasting wheel assembly.

The present invention provides an abrasive wheel assembly comprising a rotor (12), a runnerhead (13)
15 concentrically mounted on the said rotor for rotation at a predetermined operating RPM, a plurality of spaced radially arranged abrasive particle throwing vanes (14), means detachably securing the said vanes to the face of the said runnerhead, impeller means (18) carried by the
20 said rotor for feeding particulate abrasive material to the said vanes, characterised in that the said vanes are provided with an abrasive throwing face (15) having spaced side portions (29, 30) flared away from the abrasive receiving heel end portion (16) of the said vane to the
25 discharge end thereof (17) at a flare angle in the range of from 2° to 7°.

The present invention also provides an abrasive particle throwing vane for use in a rotatable blasting wheel assembly, the said vane comprising a heel end portion
30 spaced from a discharge end portion, a particle throwing face surface intermediate the said end portions characterised in that the spaced sides of the said face flare away from the said heel end portion to the said discharge end of the said throwing face at a flare angle in the range of from
35 2° to 7°.

As illustrated in the accompanying drawings, a

throwing wheel assembly of an abrasive blasting machine is generally indicated by the reference numeral 10 in FIGS. 1 and 2. Assembly 10 includes a central hub or rotor 12 to which is affixed a runnerhead 13 having a common axis therewith. A plurality of curved vanes 14 are perpendicu-
5 larly mounted on the face 15 of runnerhead 13 and extend generally radially from the axis of rotation of rotor 12. An innermost heel portion 16 of each vane 14 is spaced a distance from the axis of rotation for receiving particulate
10 abrasive material from an impeller means 18.

Impeller means 18 is disposed on the hub 12 between the heel ends 16 of vanes 14 for feeding the abrasive particles which are received from a fixed spout 20 to vanes 14 in a conventional manner. Impeller means 18
15 comprises an open ended outer case 21 having flanges 22 connected to the machine casing and open to the spout 20. An impeller 23 is disposed within case 21 and is rotatably affixed to hub 12. Impeller 23 is provided with openings 24 for discharging abrasive received from spout 20 out-
20 wardly of case 21 through a discharge opening 25 therein upon rotation of wheel 10. In this manner, abrasives are fed to the heels 16 of vanes 14 as vanes 14 rotate past the opening 25. The abrasive is then moved along the face 15 of the vane from the heel 16 to the discharge
25 end 17 for discharge therefrom at a selected blasting velocity.

The face of runnerhead 13 has formed therein a plurality of slots 26 which may be of suitable dovetail or other undercut configuration at an angle to a radial
30 line. Each slot 26 is adapted to receive a base 27 of a curved vane 14 with the base 27 being inserted into the slot 26 and removable therefrom from the periphery of the runnerhead. Once the base is inserted in a slot 26 it is retained therein by a suitable locking pin (not shown).

35 It is to be understood that the structure thus far described is conventional and is as found in known blasting

wheel devices and that the present invention which is to be described in further detail below is not limited to the particular device illustrated. The accompanying drawings have been simplified to show only conventional parts of wheel assembly 10 such as are necessary for a clear understanding of the present invention.

As mentioned above, it is a particular object of the present invention to provide a vane 14 of novel configuration for increasing the wear characteristics thereof during use by providing even distribution of the abrasive feed. To this end spaced sidewalls 29 and 30 are provided for each vane 14. Sidewalls 29 and 30 are flared away from the centre line of face 15 of a vane 14 at an angle in the range of from 2 to 7 degrees, as designated "A" and "B", respectively, in accompanying FIG. 2, from heel portion 16 to the discharge end portion 17 of the vane.

In testing of a blasting wheel having vanes 14 according to the present invention, excellent wear characteristics were achieved with containment of the abrasive along one sidewall 29 or 30 substantially eliminated. In these tests, the abrasive entering a heel 16 of a vane 14 spreads evenly transversely of face 15 resulting in even surface wear and uniform abrasive distribution.

In such tests utilizing a blasting wheel such as blasting wheel assembly 10 having an 18 inch (45.7 cm) diameter was used and operated at various RPM in the range of from 1300 to 2500 RPM. For example, a test at a speed of 2200 RPM with an abrasive flow velocity from the wheel of 250 FPS (7620 cms/sec) showed no improvement or additional spread was effected at a flare angle greater than $2\frac{1}{2}^{\circ}$. In a test at 1700 RPM and an abrasive flow velocity from the wheel of 190 FPS (5791 cms/sec), no spread occurred beyond a flare angle of 7° . At 1300 RPM and 150 FPS (4572 cms/sec), no spread occurred beyond 10° or greater. It was further found that no change in

abrasive spread characteristics was effected by changing
flow rates of the abrasive from the impeller 18 to the vanes
14. It was determined that the spread of abrasive
was identical regardless of the latter flow rates provided
5 the flow was within the capacity of the wheel assembly 10.
It was concluded that the spread is governed by the flare
angle of sidewalls 29 and 30, the RPM of the wheel assembly
10 and the acceleration of the abrasive along the face of
the vane.

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Claims:

1. An abrasive wheel assembly comprising a rotor (12), a runnerhead (13) concentrically mounted on the said rotor for rotation at a predetermined operating RPM, a plurality of spaced radially arranged abrasive particle throwing vanes (14), means detachable securing the said vanes to the face of the said runnerhead, impeller means (18) carried by the said rotor for feeding particulate abrasive material to the said vanes, characterised in that the said vanes are provided with an abrasive throwing face (15) having spaced side portions (29, 30) flared away from the abrasive receiving heel end portion (16) of the said vane to the discharge end thereof (17) at a flare angle in the range of from 2° to 7°.
2. A device as claimed in claim 1 wherein the said wheel assembly has a diameter of about 18 inches (45.7 cms), an operating RPM of the said rotor in the range of from 1700 to 2500 RPM and an abrasive flow velocity in the range of from 170 to 290 FPS (from 5181 to 8840 cms/sec).
3. A device as claimed in claim 1 or claim 2 wherein the said flare angle is no greater than 2½° and the said operating speed is 220 RPM.
4. A device as claimed in any of claims 1 to 3 wherein the throwing face of the said vane is of a curved configuration from the heel portion to the discharge end of the vane at the periphery of the said runnerhead.
5. A device as claimed in claim 4 wherein the said sides of the said vane face include spaced side walls flaring away from the said heel portion.
6. A device as claimed in any of claims 1 to 5 wherein the said impeller comprises a stationary outer casing and

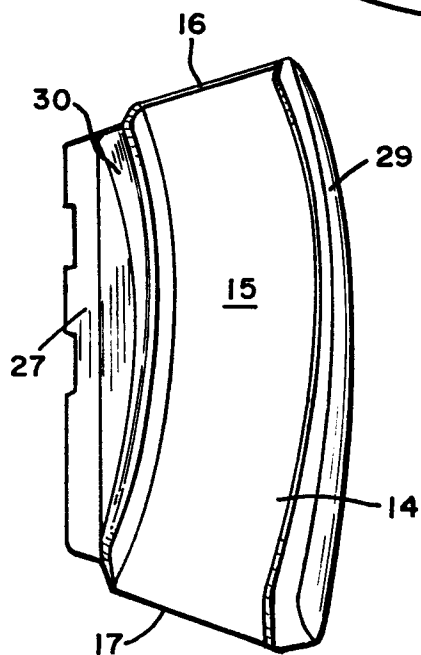
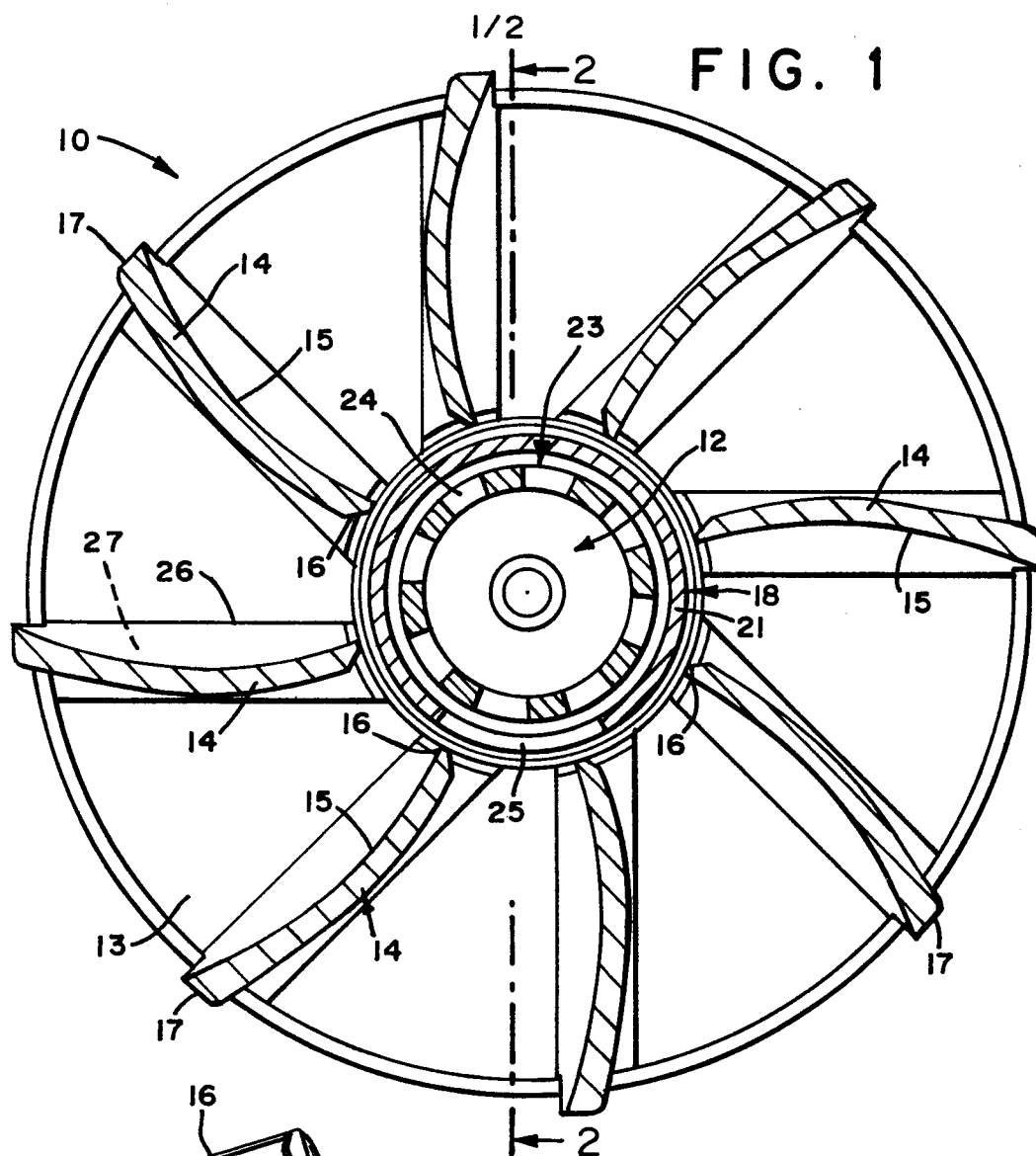
an impeller within the said outer casing rotatably connected to the said rotor, a discharge opening in the said outer casing for feeding abrasive material from the said rotatable impeller to the heel end portion of the said vanes.

7. An abrasive particle throwing vane for use in a rotatable blasting wheel assembly, the said vane comprising a heel end portion spaced from a discharge end portion, a particle throwing face surface intermediate the said end portions, characterised in that the spaced sides of the said face flare away from the said heel end portion to the said discharge end of the said throwing face at a flare angle in the range of from 2° to 7° .

8. A throwing vane as claimed in claim 7 wherein the said flare angle is no greater than $2\frac{1}{2}^{\circ}$.

9. A throwing vane as claimed in claim 7 or claim 8 wherein the face of the said vane is curved from the said heel portion to the said discharge end.

10. A throwing vane as claimed in any of claims 7 to 9 wherein the said spaced sides of the said throwing face comprise vertical sidewalls flaring away from the heel portion to the discharge end of the said vane at the said flare angle.



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